

REMARKS

This Amendment is filed in response to the Office Action mailed on January 31, 2007, and is herewith filed a Request for Continuing Examination. All objections and rejections are respectfully traversed.

Claims 23-46 are currently pending.

Claim 46 is added.

Request for Interview

The Applicant respectfully requests a telephonic interview with the Examiner after the Examiner has had an opportunity to consider this Amendment, but before the issuance of the next Office Action. The Applicant may be reached at 617-951-3067.

Claim Rejection – 35 USC §103

At paragraphs 5-17 of the Office Action, claims 23, 25, 26, 28, 29, 31, 33, 34, 36, 37, 39-41, and 45 are rejected under 35 U.S.C. §103 as being unpatentable over Meyer, US Patent No. 5,867,733, hereinafter Meyer, in view of Ohran et al., US Patent No. 5,649,152, hereinafter Ohran.

The present invention, as set forth in representative claim 23, comprises in part:

23. A storage controller, comprising:

snapshot logic;
copy logic; and
an internal cache;

the controller being operable to communicate with a replication manager to receive a snapshot command issued by the replication manager, the snapshot command specifying a range of data bytes of a source volume;

the controller being operable to communicate with the replication manager to receive a copy specifying the source volume and a target volume;

the controller being operable to receive a write command specifying the source volume;

the snapshot logic being operable, in response to the snapshot command, to take a snapshot of the range, the snapshot including a snapshot map and snapshot data, the snapshot map being stored in a snapshot volume; and

the copy logic being operable in response to receiving the copy command to generate and send one or more storage device commands to one or more storage devices for the source and target volumes to copy data from the source volume directly to the target volume without having a file server in the data path, the copy logic using the snapshot map and the snapshot data to maintain coherency of the copied data.

By way of background, Meyer discloses a system for direct transfer from one mass storage device to a second storage device using an enhanced integrated drive and electronics (EIDE) controller. A processor in a PC computer (host) initializes the transfer of data from one disk to a second disk. The transfer of data from one disk to the second disk is controlled by the data storage device controller, and is accomplished without employing the memory array and the computer bus.

Ohran discloses a system for generating a static snapshot where data is stored in a preservation memory. Prior to a write operation, the preservation memory is checked to see if the data for the write request is in the preservation memory. If the data is not in the preservation memory, the data is copied from disk to the preservation memory, then modified and written to a mass storage device. If the data is in the preservation memory, then the write request is processed on the data and stored on a disk. This allows each further write request to be

processed on the original data, and not the modified data unless the modified data is specifically request with a different block range.

Applicant respectfully urges that Meyer and Ohran, taken alone or in combination do not teach nor suggest Applicant's claimed novel *the snapshot logic being operable, in response to the snapshot command, to take a snapshot of the range, the snapshot including a snapshot map and snapshot data, the snapshot map being stored in a snapshot volume and the copy logic being operable in response to receiving the copy command to generate and send one or more storage device commands to one or more storage devices for the source and target volumes to copy data from the source volume directly to the target volume without having a file server in the data path, the copy logic using the snapshot map and the snapshot data to maintain coherency of the copied data.*

In further detail, in Applicant's claimed invention data (byte range of blocks) in a write request are copied to the snapshot volume prior to modifying the data and storing on disk. On a second write request to the data, the previously modified data is written to the snapshot volume, and the data is modified for a second time and stored on disk. When the data is moved from source volume to a target volume, the storage device controller uses the snapshot map stored in memory (cache) to maintain coherency in the copied data. Applicant's invention uses memory in the controller but not a file server to assist in the copying of data from a source volume to a target volume. In contrast, Meyer teaches away from Applicant's invention by "transferring data directly between the first and second data storage devices under control of the data storage device controller, without employing the memory array and computer bus." (Meyer, Col. 4, lines 38-42). If Applicant were to follow the teaching in Meyer, then during transfer the volume

map could not be checked for proper coherency between snapshot data and source data.

Furthermore, Ohran does not disclose copying data from a source volume to a target volume using a snapshot map to maintain coherency because Ohran does not move data from a source volume to a target volume. Ohran merely creates a static snapshot in persistent memory. The snapshot in Ohran is different than Applicant's snapshot because Applicant's snapshot allows copies of modified data and the original data to be stored in the snapshot volume after multiple write requests. Ohran only allows the original data to be stored in the persistent memory because the write request for a block range is first applied to persistent memory.

Accordingly, Applicant respectfully urges that Meyer and Ohran, taken alone or in combination, are legally insufficient to make obvious the presently claimed invention under 35 U.S.C. § 103 because of the absence of the Applicant's claimed novel *the snapshot logic being operable, in response to the snapshot command, to take a snapshot of the range, the snapshot including a snapshot map and snapshot data, the snapshot map being stored in a snapshot volume and the copy logic being operable in response to receiving the copy command to generate and send one or more storage device commands to one or more storage devices for the source and target volumes to copy data from the source volume directly to the target volume without having a file server in the data path, the copy logic using the snapshot map and the snapshot data to maintain coherency of the copied data.*

At paragraph 18 of the Office Action, claims 24, 27, 32, and 35 were rejected under 35 U.S.C. §103 as being unpatentable over Meyer, in view of Ohran and in further view of Tawil, US Patent No. 6,421,723

At paragraph 21 of the Office Action, claims 30 and 38 were rejected under 35 U.S.C. §103 as being unpatentable over Meyer, in view of Ohran and in further view of Dulai et al., US Patent No. 6,205,479.

At paragraph 23 of the Office Action, claims 42-44 were rejected under 35 U.S.C. §103 as being unpatentable over Meyer, in view of Ohran and in further view of Simpson et al., US Patent No. 6,128,306.

Applicant respectfully notes that claims 24, 27, 30, 32, 35, 38, and 42-44 are dependent claims that depend from independent claims believed to be in condition for allowance. Accordingly, claims 24, 27, 30, 32, 35, 38, and 42-44 are believed to be in condition for allowance.

All independent claims are believed to be in condition for allowance.

All dependent claims are believed to be dependent from allowable independent claims.

Applicant respectfully solicits favorable action.

Please charge any additional fee occasioned by this paper to our Deposit Account
No. 03-1237.

Respectfully submitted,

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